

C T Jackson

Boston Jan'y 5th 1844

Prof Asa Gray

My dear Sir,

In reply to your letter of 4th inst I am happy to state that, I have a diagram on a sheet of drawing paper representing the structure of the different varieties of Grains & numerous grains to which the chemical tests have been applied. All of which are at your service. You may have better drawings made from my specimens than I have been able to paint myself - & from your knowledge of the botanical structure of seeds you may be able to bring out some more details regarding the different parts of them, mine having been made only to illustrate the chemical nature of the different parts -

Please refer to the Proceedings of the Bot Soc that list for a brief history of these researches. There you will see that I have credited to my friend A. A. Hayes as I always have done the application of the Sulphate of Copper, & the Sulphydrate of Ammonia tests. I mention this since I heard that some Middlesex Pressman last summer took the trouble to misrepresent me and said that I took undue credit in this matter to the disadvantage of friend Hayes, while the fact is that I had shown up his researches in his former almost neglecting my own it being much more agreeable to me to speak of a friend's researches than of my own -

I discovered the Phosphoric acid united with ammonia or some volatile or destructible base in Corn in 1840 and subsequently in all the other grains in combination with Lime Magnesia & ammonia. I also found Oxide of Iron & Manganese in the ashes of grains.

Mr. Boyce first discovered the application of the tests Sulphate of Copper & Hydrated Ammonia to determine the limits of their matters in Corn. I applied them to all kinds of seed & discovered the general law that the Phosphates & the Iron salts were confined to the Cotyledons of all the seeds which are not so oily as to prevent the action of these tests. - The separation of oil from Corn was discovered by the distillation of Corn Whiskey in the Western States & the process is common in France on the borders of Lake Ontario the oil being used for the light Houses -

I analyzed several varieties of Corn at the request of Mr. Ellsworth to ascertain the relative amounts of oil in them & found that the Rice Corn contained the most, Canada Pop Corn next the next rank, & our common flint Corns the next &c while Tuscarora corn was found to be quite destitute of oil. - The proportions of oil in Corn vary from 6 to 11 per cent according to the variety. - This explains the dispute between Sillby & James. - The oil is in cells in the translucent glutinous portion of the grains. This I proved by Chemical researches & Owen Mason of Providence has since examined the cells by means of

the microscope formerly belonging to Prof Bailey & says he has seen the globules of oil in the cells & he has sent me a drawing of their appearance drawn under the Camera lucida eye piece of the microscope. - Corn that contains oil will always explode by parching every cell of gluten & starch when the oil is contained long retained by the decomposition of the oil & the formation of gases. Hence the theory of Pop Corn explosion. Please try the following varieties Tuscarora Corn which cannot be popped or exploded - Southern Corn which explodes on the sides, Brown Corn which explodes near the base Pop Corn at the summit. - the weakest part of the axis & entirely evolves

Rice corn which receptives very irregularly from its being full of oil & having a conical form. - You may separate the oil from Indian corn meal by fermenting it with a solution of Barley Malt. 100 bushels of Corn yields $15\frac{1}{2}$ Gallons of oil according to the distillers account in Lake Ontario. I suppose the Southern Corn is the variety they use. - They ferment with Barley or Corn Malt. Rice absorbs the oil hence none of our distillers using Rice & corn mix & separate any oil. - The Grain of Dr Gosham is Gluten soaked in oil. - It contains according to my analysis 5 per cent of Nitrogen. - This was overlooked by Gosham since no accurate process for the determination of this element was known in his day. - It seems strange to me that the presence of ammonia in Corn was not so soon discovered since it is always separated abundantly in the

process of hulling corn by Potash Lye for making
 an old Colony dish of Sams or Succotash. After my
 discovery of it by Analysis I well remembered the
 odor produced by hulling corn in my mother's kitchen
 in Old Plymouth. Our great grandmothers used also
 to parch corn & rub their fingers with it preparatory
 to spinning because it made their fingers smooth &
 oily so that the yarn ran well through them.

Prof Asa Gray
 Harvard University
 Cambridge
 Mass.

Will you please secure for me two of
 the thickest to your lectures & therefore
 me the trouble of waiting half a day to
 stand my chance with the practice -

yet we find Siribis disputing with Dumas about the
 presence of oil in ^{this} grain - ! & many modern Chemists
 have overlooked its presence. - I have just been
 reading old Carl Sundenrot's work on the Chemistry
 of Agriculture. It was published too early for the age
 in 1775. ~~but~~ is a rare & valuable work & takes the
 wind out of Dr Dana's sails. All his supposed discoveries
 being there recorded - Truly Yours with esteem
 C. T. Jackson



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